Fourth Guiding model (Chemistry 2026)

1-All of the following are characteristics of transition elements that lead to the formation of substitution alloys, except:

(a) Similarity in their atomic radii

(b) Similarity in their chemical properties

(c) They have the same crystal lattice structure

(d) They react easily with each other

2- Two transition elements (X) and (Y) from the first transition series.

(X): One of its oxides is used as a catalyst in the manufacture of superconducting Magnets.

(Y): Its atom contains unpaired electrons twice that found in element (X).

- Which of the following is correct?

(a) The atomic radius of element (Y) is less than that of the element follow it in The series.

(b) The effective nuclear charge of element (Y) is less than that of element (X).

(c) The maximum oxidation state of element (Y) is higher than that of element (X).

(d) The density of element (Y) is less than that of the preceding element in the series.

3- Element (X) from the first transition series contains completely filled (d) sublevel.

-Which of the following expresses the type of element (X) and electronic distribution of this element's ion in the compound X_2O?

(a) Transition, [Ar] $3d^{10}$

(b) Transition, [Ar] $3d^{9}$

(c) Non-transition, [Ar] $3d^{10}$

(d) Non-transition, [Ar] $3d^{9}$

4- All of the following occur to iron ore during roasting process except:

(a) Some gases and vapors are produced from the ore.

(b) All iron ores oxidizes.

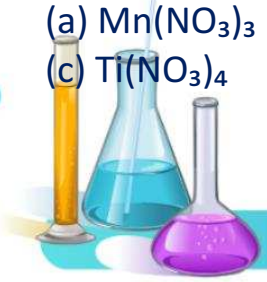
(c) The color of limonite and siderite changes.

(d) Most of the impurities in the ore oxidize.

5- Which transition metal ions in the following compounds is the easiest to Reduce?

(a) $Mn(NO_3)_3$ (b) $Fe(NO_3)_3$

(c) $Ti(NO_3)_4$ (d) $V(NO_3)_5$



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6- Hydrochloric acid is added to a solid salt, gas evolves forms a black precipitate when passed through an acidified copper nitrate solution.

-Which of the following represents the solid salt?

(a) Sodium nitrate
(b) Potassium sulphide
(c) Sodium sulphite
(d) Sodium bicarbonate

7- All of the following solutions can be used to distinguish between magnesium sulphate and magnesium chloride except:

(a) Barium chloride
(b) Hot concentrated sulfuric acid
(c) Calcium bicarbonate
(d) Dilute hydrochloric acid

8- Which of the following solutions can be used to separate $Fe(OH)_2$ mixed with $Al(OH)_3$?

(a) $NaOH_{(aq)}$ (b) $NH_4OH_{(aq)}$
(c) $NaCl_{(aq)}$ (d) $HCl_{(aq)}$

9- When adding hot concentrated sulphuric acid is added to salt (X) , colorless gas evolved, and the same acid reacts with salt (Y) and violet vapors evolved turns paper wet with starch to blue , then the two salts are:

	X	Y
A	Sodium chloride	Sodium iodide
B	Sodium bromide	Sodium iodide
C	Sodium nitrate	Sodium sulphate
d	Sodium chloride	Sodium bromide

10- A mixture of copper II, lead II, and calcium nitrates.

-Which of the following expresses the correct order of substances that can be added to this mixture to separate each cation separately?

(a) Sodium carbonate, then hydrogen sulphide gas
(b) Diluted sulphuric acid, then silver nitrate solution
(c) Hydrochloric acid, then sulphuric acid
(d) Hydrochloric acid, then sodium carbonate

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11-Which of the following choices does not represents equilibrium system?:

(a) Dissolving ammonia gas in water

(b) A reversible reaction with constant concentrations.

(c) Strong heating of hydrated barium chloride salt.

(d) A saturated solution of a sparingly soluble salt.

12- (A,B) Two solutions of HCl acid:

- **Solution (A): Its volume one liter and contains one mole of acid.**
- **Solution (B): Its volume one liter and contains half a mole of acid.**

16.25 g of zinc are added to each solution at the same temperature.

-Which of the following is correct? (Zn=65)

(a) The reaction rate in solution (A) is faster, and the amount of hydrogen produced In (A) is greater.

(b) The reaction rate in solution (A) is faster, and the amount of hydrogen Produced is equal in both solutions.

(c) The reaction rate in solution (B) is faster, and the amount of hydrogen produced In (B) is greater.

(d) The reaction rate in solution (B) is faster, and the amount of hydrogen Produced is equal in both solutions.

13- In the following equilibrium system:

$$2H_2O_{(l)} \rightleftharpoons 2H_{2(g)} + O_{2(g)} \quad , \Delta H = +286 \text{ kJ}$$

-Which of the following choices is correct when lowering the temperature?

(a) The equilibrium constant Kc increases and the rate of water dissociation Decreases.

(b) The equilibrium constant Kc increases and the rate of water formation Decreases.

(c) The equilibrium constant Kc decreases and the rate of water dissociation Decreases.

(d) The equilibrium constant Kc decreases and the rate of water formation Decreases.

14- The following reaction at equilibrium state at a certain temperature:

$$2HI_{(g)} \rightleftharpoons H_{2(g)} + I_{2(g)}$$

The total pressure at equilibrium = 2 atm, and the partial pressure of H_2 and I_2 is:

$$(P_{H_2} = P_{I_2} = 0.4 \text{ atm})$$

-Which of the following represents the value of K_P when the volume of the container is reduced by half?

(a) 0.05 (b) 0.11 (c) 0.25 (d) 0.40

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15-Two solutions (A) and (B) have the same volume and initial concentration.
Sample (A): weak acid solution (such as CH_3COOH).
Sample (B): weak base solution (such as NH_4OH).
Both samples are diluted by adding 100 mL of distilled water to each.
-Which of the following is correct?
(a) The pH decreases in both samples (A) and (B).
(b) The pH of sample (A) increases and the pH of sample (B) decreases.
(c) The pH increases in both samples (A) and (B).
(d) The pH of sample (A) decreases and the pH of sample (B) increases.

16- 500 mL of sodium hydroxide (NaOH) solution its pH = 12.0
-The mass of dissolved sodium hydroxide (NaOH) dissolved in this solution is:
(Na=23, O=16, H=1)
(a) 2.0 g (b) 0.2 g (c) 0.4 g (d) 4.0 g

17- Which of the following reactions could represent a spontaneous reaction within an electrochemical cell?
(a) $Cu_{(s)} + Zn^{2+}_{(aq)} \rightarrow Cu^{2+}_{(aq)} + Zn_{(s)}$
(b) $Mg_{(s)} + Zn^{2+}_{(aq)} \rightarrow Mg^{2+}_{(aq)} + Zn_{(s)}$
(C) $2Ag_{(s)} + Cu^{2+}_{(aq)} \rightarrow 2Ag^{+}_{(aq)} + Cu_{(s)}$
(d) $3Cu_{(s)} + 2Al^{3+}_{(aq)} \rightarrow 3Cu^{2+}_{(aq)} + 2Al_{(s)}$

18- A cell consisting of two electrodes (X) and (Y), where:
$E°(X^{3+}/X) = -1.670$ V
$E°(Y^{2+}/Y) = +0.34$ V
-Which of the following expresses the number of cells consisting of these two electrodes that must be connected in series to obtain a battery with an emf of 8.05 V and the role of each electrode in the cell?
(a) 4 cells, with (Y) as the anode and (X) as the cathode
(b) 6 cells, with (Y) as the anode and (X) as the cathode
(c) 4 cells, with (X) as the anode and (Y) as the cathode
(d) 6 cells, with (X) as the anode and (Y) as the cathode

19- The following table represents electrical potentials of four metals (X, Y, Z, W):

W	Z	Y	X
W/W^{2+}= -1.42 V	Z^{2+}/Z= -2.375 V	Y/Y^{2+}= -1.2 V	X^{2+}/X= 0.34 V

-Which of the metals is the fastest to corrode when it is in contact with zinc?
(a) X (b) Y **[$Zn \rightarrow Zn^{2+} + 2e^-$, E^0= 0.76V]**
(c) Z (d) W

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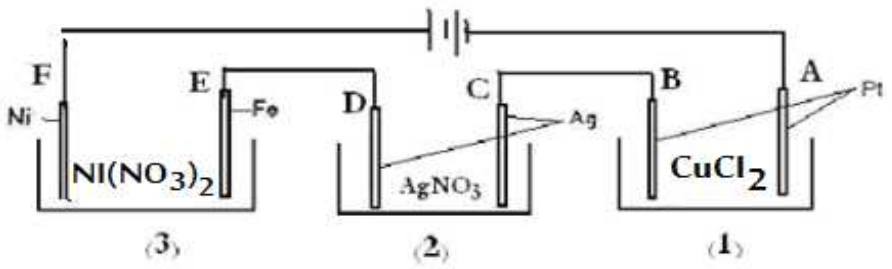
20- The following figure shows three cells connected in series:



(Ni=58.7g/mol, Ag=108g/mol, Cu=63.5g/mol)

When an electric current passes through the circuit for a quarter of an hour, which electrode increases in mass at the greatest rate?

(a) A (b) C (c) D (d) E

21- Which of the following represents an oxidation-reduction reaction can be used to obtain electrical energy?

(a) Conversion of lead sulphate into Lead (IV) ions in car battery

(b) Coating parts of cars with (Cr) electrically metal to protect them from rust

(c) Analysis of water into hydrogen and oxygen by electricity.

(d) Combination of hydrogen with oxygen to form water.

22- Which of the following occurs in a lead-acid battery during charging?

(a) Pb^{2+} ions are converted to Pb^{4+} ions at the cathode.

(b) Pb^{2+} ions are converted to Pb ions at the anode.

(c) Electrons are transferred from the (-ve) electrode to (+ve) electrode.

(d) Electrons are transferred from the anode to the cathode.

23- Two organic compounds(X) and (Y):

(X) : Hydrocarbon reacts violently with chlorine, accompanied by light and flame.

(Y) : Halogenated derivative of hydrocarbon used as insecticides.

- Which of the following is true?

(a) X : Aromatic hydrocarbon obey to the formula C_nH_{2n-6}

(b) Y : Aromatic derivative obey to the formula $C_nH_{n-1}Cl$

(c) X : Aliphatic hydrocarbon obey to the formula C_nH_{2n}.

(d) Y : An aliphatic obey with the formula $C_nH_nCl_n$

24- Alkane has the molecular formula C_6H_{14} and contains four methyl groups and doesn't contain methylene groups.

-Which of the following expresses the IUPAC name for this compound?

(a) 2,2-dimethyl butane (b) 3,3-dimethyl butane

(c) 2,3-dimethyl butane (d) 4,1-dimethyl butane

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25- Which of the following is the number of isomers of open-chain aliphatic compounds and don't react with sodium metal for the formula $C_4H_{10}O$?

(a) 3
(b) 4
(c) 5
(d) 7

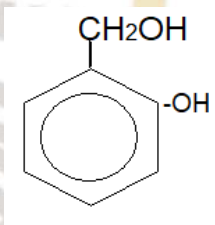
26- Which of the following describes a method for preparing 2-methyl propane?

(a) Neutralization of 2-methyl propanoic acid followed by dry distillation.
(b) Dehydration of 1-propanol followed by hydrogenation.
(c) Neutralization of 3-methyl butanoic acid followed by dry distillation.
(d) Dehydration of 1-butanol followed by hydrogenation.

27- Which of the following expresses the correct order of operations processes required to obtain benzene from a compound with the formula $C_6H_{13}COOH$?

(a) Reduction – dehydration– oxidation
(b) Neutralization – dry distillation -hydrogenation
(c) Reduction – dehydration –catalytic reforming
(d) Neutralization – dry distillation – catalytic reforming

28- Which of the following expresses the use of the compound produced from complete oxidation of the opposite compound?



(a) Preparation of Dacron fabric
(b) Preparation of drugs
(c) Preparation of Bakelite
(d) Preparation of explosives

29- (X, Y) organic carboxylic acids:

X: An aromatic acid every mole can reacts with 2 moles of caustic soda.
Y: An aliphatic acid every mole can reacts with 3 mole of caustic soda then 1 mole of sodium metal

Which of the following may represents acids(X) and (Y)?

(a) (Y) : lactic acid secreted by the body during hard effort.
(b) (Y) : citric acid, used as a preservative for frozen fruits.
(c) (X) : Terphthalic acid, used in the manufacture of synthetic silk.
(d) (X) : salicylic acid, used in manufacture of Dacron fibers

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30- (Y, X, Z) Three organic compounds:

X: The simplest aliphatic hydroxylic compound

Y: The simplest aromatic hydroxylic carboxylic acid

Z: Produced from the reaction of (X) and (Y)

- Which of the following expresses each of (Z,Y,X)?

	X	Y	Z
A	Methyl alcohol	Salicylic acid	Acetyl salicylic
B	Ethyl alcohol	Benzoic acid	Ethyl benzoate ester
C	Methyl alcohol	Salicylic acid	Methyl salicylate ester
d	Phenol	Formic acid	Phenyl Formate ester

31- Which of the following represents the product of alkaline hydrolysis of the 1-bromo-2-methyl propane?

(a) Secondary propyl alcohol (b) Isobutyl alcohol

(c) 2-methyl-2-propanol (d) tertiary butyl alcohol

32- Two organic compounds (X) and (Y):

(X): 1-bromo-1-propanol

(Y): 2-bromo-2-propanol

-The following processes were carried out in order for each of the compounds (X) and (Y) separately: (alkaline hydrolysis – reduction)

-Which of the following expresses the final result of these processes on each of the compounds (X) and (Y)?

	Product of (X)	Product of (Y)
A	Propanal	Propanone
B	Propanal	2-propanol
C	1-propanol	2-propanol
d	1-propanol	propanone

33-Which of the following describes the processes necessary to obtain a polymer used in electrical appliances?

(a) Alkaline hydrolysis of 1-chloroheptane – polymerization with formaldehyde

(b) Oxidation of ortho-hydroxy toluene – polymerization with ethylene glycol

(c) Alkaline hydrolysis of 1-chloroheptane – oxidation – polymerization with Ethylene glycol

(d) Catalytic forming of 1-chlorohexane – alkaline hydrolysis – polymerization with Formaldehyde

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34- What is the correct sequence of processes and furnaces that hematite ore goes through to obtain iron steel?

(a) Roasting – Midrex furnace – Blast furnace

(b) Roasting – Midrex furnace – Oxygen converter

(c) Electric furnace – Midrex furnace – Open hearth furnace

(d) Open hearth furnace – Blast furnace – Oxygen converter

35- Dissolve 0.5 g of a pure sample of metal chloride (MCl) in water and add an excess of silver nitrate to the solution to precipitate 0.963 g of silver chloride.

-The atomic mass of metal M is equal to: (Ag=108g/mol , Cl=35.5g/mol)

(a) 39 (b) 23 (c) 40 (d) 24

36- Volume (X) L of 0.2M potassium hydroxide solution, 20mL of distilled water was added to it, then 20mL of the produced solution was titrated with a solution of sulphuric acid containing 0.1176g of acid.

-The volume of potassium hydroxide (X): (H=1, S=32, O=16,K=39)

(a) 30mL (b) 20mL (c)50 mL (d) 40 mL

37- Four saturated solutions of the following sparingly soluble at 25°C:

(1) AgCl , Ksp= 1.0×10^{-10} (2) PbI_2 , Ksp= 4.0×10^{-12} ,

(3) AgBr , Ksp= 1.0×10^{-8} (4) BiI_3 , Ksp= 2.7×10^{-15}

Which of the following expresses the order of these solutions according to their electrical conductivity?

(a) 1 < 2 < 3 < 4 (b) 1 < 3 < 2 < 4

(c) 4 < 2 < 1 < 3 (d) 4 < 2 < 3 < 1

38- The corresponding figure represents one of the gas reactions.

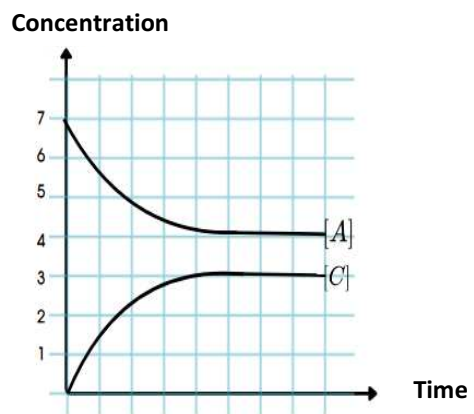
-Which of the following represents the reverse reaction equation for the reaction shown and its equilibrium constant value?

(a) A⇌C, and Kc=0.75

(b) C⇌A, and Kc=1.33

(c) A⇌C, and Kc=1.33

(d) C⇌A, and Kc=0.75



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39- The following reaction occurs in an electrochemical cell:

$$2M_{(s)} + 3Zn^{2+}_{(aq)} \rightarrow 2M^{3+}_{(aq)} + 3Zn_{(s)} \quad , E^{\circ}_{cell} = +1\ V$$

If you know that: $Zn^{2+}_{(aq)} \rightarrow Zn_{(s)}$, $E^{\circ} = -0.76\ V$

- Which of the following expresses the type of electrode (M) and its oxidation potential, as well as the type of cell?

(a) Electrode (M) is an anode and its oxidation potential = +1.76 and the cell is galvanic

(b) Electrode M is an anode and its oxidation potential is = +0.24 and the cell is electrolytic

(c) Electrode M is a cathode and its oxidation potential is = -0.24 and the cell is electrolytic

(d) Electrode M is a cathode and its oxidation potential is = -1.76 and the cell is galvanic

40- When one farad is passed through a molten sodium chloride, which of the following expresses the number of moles of gases evolved?

(a) 0.5 mol

(b) 1 mol

(c) 1.5 mol

(d) 2 mol

41- (A) and (B) Organic acids:

(A): Does not respond to acidity test.

(B): Used in the preparation of a compound used to treat headaches.

-Which of the following represents acids (A) and (B)?

(a) (A) is acetic acid, while (B) is salicylic acid.

(b) (A) is an acid that does not reduce by hydrogen in presence of copper II Chromate, while (B) is salicylic acid.

(c) (A) Acetic acid, while (B) is benzoic acid.

(d) (A) Carbolic acid, while (B) is an acid that can be prepared by oxidizing Para-methyl toluene.

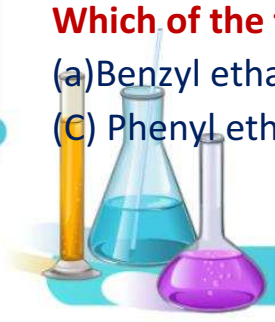
42-From the following diagram:

C_6H_6 —Alkylation→ X —Oxidation→ Y —$+ C_2H_5OH$→ Z

Which of the following represents the compound (Z)?

(a)Benzyl ethanoate (b) Ethyl benzoate

(C) Phenyl ethanoate (d) methyl benzoate



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43- From the following table that illustrates 3 experiments :

Experiment number	Organic compound	The added solution	Observation
1	X	CH_3OH	Fruity odor evolved
2	Y	acidified $KMnO_4$	Violet color disappear
3	Z	Bromine water	White precipitate is formed

-Which of the following represents the compounds (X,Y and Z)?

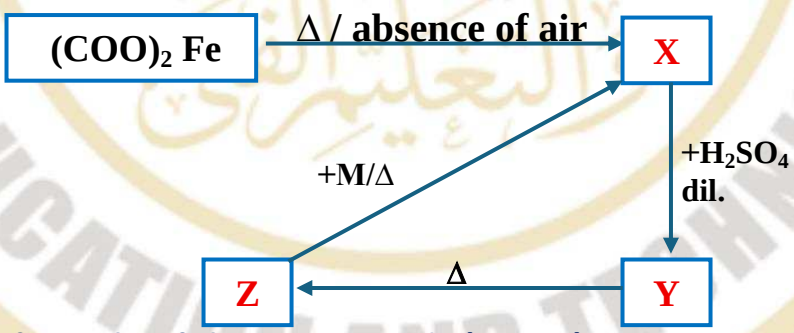
(a) (X): Acetic acid , (Y): 2-propanol , (Z): Carbolic acid
(b) (X): Carbolic acid , (Y): 2-methyl-2-propanol, (Z): Acetic acid
(c) (X): Methanoic acid , (Y): Benzoic acid , (Z): Carbolic acid
(d) (X): Acetaldehyde , (Y): 2-propanol , (Z): Carbolic acid

44- Which of the following expresses the correct order of chemical processes necessary to prepare propane from propyl propanoate?

(a) Alkaline hydrolysis → Dry distillation of acid salt → Catalytic hydrogenation
(b) Alkaline hydrolysis → Dehydration → Catalytic hydrogenation
(c) Acidic hydrolysis → oxidation → dehydration
(d) Acidic hydrolysis → oxidation → addition of sodium hydroxide

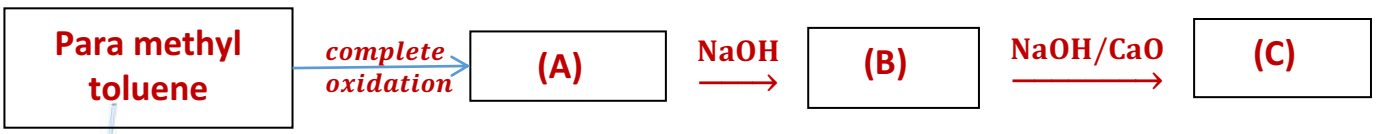
Essay questions:

45. Study the following diagram and answer:



1-Write chemical formula of the compounds (M,X,Y)
2-write the chemical formula of the compound with the highest magnetic Moment in the above diagram.

46. Study the following diagram and answer:



1-write the structural formula of the compounds (A, B, C)
2-Mention one use of the compound (A)

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Dr.MoRizK

اجابه الامتحان الاسترشادي الرابع كيمياء لغات انجليزي 2026 موقع الدكتور محمد رزق التعليمي

رقم السؤال	الاجـــــــابة
1	D
2	C
3	A
4	B
5	A
6	B

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7	D
8	A

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9	A
10	C
11	C
12	B
13	C
14	B
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15	B
16	B
17	B
18	C
19	C
20	B
21	D

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22	D
23	D
24	A
25	A
تم بواسطه موقع الدكتور محمد رزق التعليمي	
26	C
27	D
28	B
29	B
30	C
31	B
32	C
33	D
34	B

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A	35
A	36
B	37
B	38
A	39
A	40
B	41
B	42
A	43
B	44

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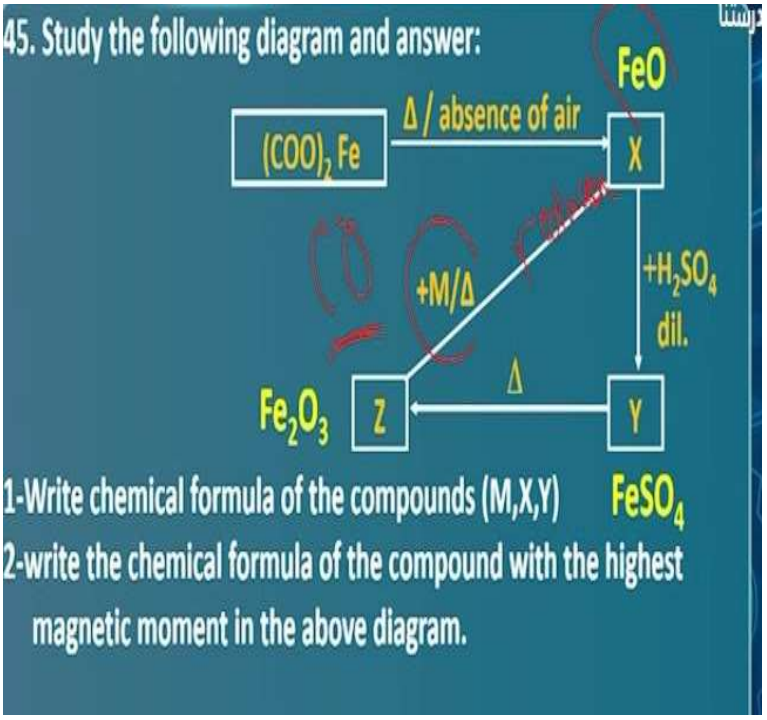
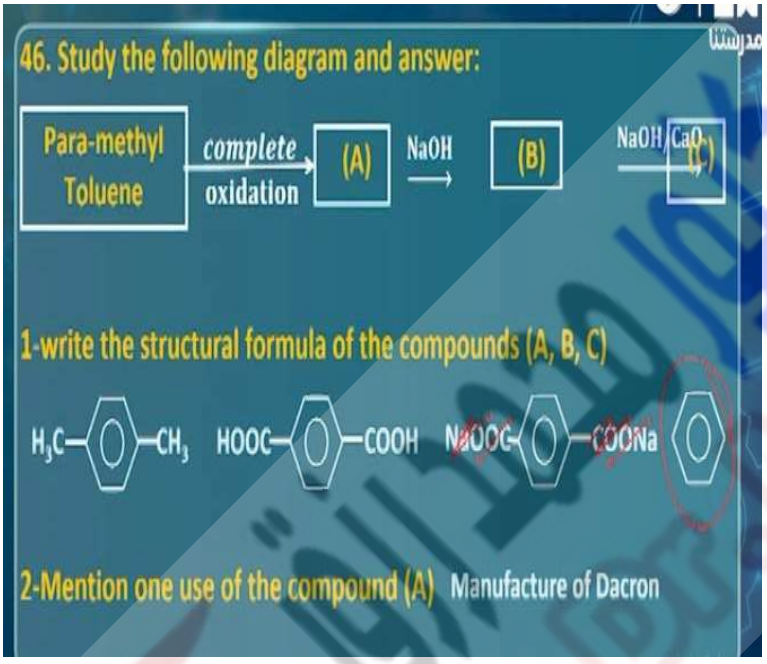
	45
	46
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